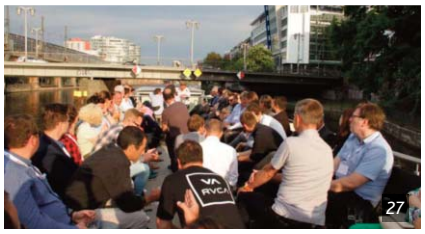

Physical and computer modelling, barbecue, cruise and banquet

As traditional at Textile Roofs, the workshop was completed with physical (Fig. 24) and computer modelling (Fig. 25), a barbecue (Fig. 26), the cruise on the Spree (Fig. 27) and the banquet, which brought together more participants than the presentations.

Figure 24: Physical modelling.
Figure 25: Computer modelling.
Figure 26: TR 2022 barbecue.
Figure 27: Spree river cruise.

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TEXTILE ROOFS 2023

The twenty-sixth International Workshop on the Design and Practical Realisation of Architectural Membrane Structures will be held on May 3rd to 5th, 2023. Its format will be similar to that of TR 2022, with seminar-style lectures, hands-on activities, barbecue, river cruise and banquet. The main objectives of the workshop are to provide fundamental information, as well as presenting the state-of-the-art in textile roof engineering and getting together. More information at: http://www.textile-roofs.de.

Bouncing Bridge

Paris, France

AZC Atelier (Atelier Zündel Cristea, architecture office founded in 2001 in Paris) and Ramon Sastre are invited to give a joined keynote lecture on pneumatic temporary structures at TENSINANTES 2023, the TensiNet Symposium at Nantes Université (7-9.06.2023). One of their amazing projects is the Bouncing Bridge. This project won an international competition "Contemporary Bridges in Paris", organised by ArchTriumph (London) in 2012, with a bridge across the River Seine.

The project consisted of three tubular pneumatic 3D rings, 30m diameter, with a trampoline in their interior. Each ring was a double symmetrical 3D ring with two lower points touching the water and the other two high points, at the middle, of the ring (Fig. 1). Once the architects won the competition, they had the possibility to build variants of this project around the world, so they started to look for a firm who could build the project. Finally, they decided to order the project to a Catalan firm, near the French border, "T&P Construcció Tèxti s.c.p." whose CEO was Ton Miserachs, an industrial man (industrialist?) who through the years had become a friend of mine. As soon as he received the commission, he asked me to develop the technical project. In fact, the technical project was a hard challenge because:

1. It was a floating structure, which means a lot of nautical knowledge that was beyond my field of expertise. (I mentioned that if it was going to be built in a river, I wasn't able to produce a project with the necessary resistance to the water current forces);
2. It was about a tubular pneumatic structure, which meant a design and construction challenge.

We started with the floating design. First of all, we changed the contact of the ring with the water. We sacrificed the double symmetry in order to gain stability. The ring passed from a double symmetry to a single symmetry, creating a piece of tube straight instead of the lower points, allowing to maintain better stability. The higher points stayed.

Figure 1. Bouncing Bridge over the Seine
Figure 2. Movable pavilion 'Pavelló de fira' by T&P, 2006
Figure 3. Analysis of a pneumatic beam, T&P, Cornellà de Terri, 2007
Figure 4a/c. Prototype with 3m diameter, 2013 © Ramon Sastre
Figure 5a>f. Prototype with 10m diameter, 2013 © Ramon Sastre
Figure 6. Peace Pavilion, AZC, London, 2013

Once we made these changes to improve floating, we had to front the second challenge: the construction of the tube. In fact, it was something that affected directly to T&P. We had already made some projects with tubes (Fig. 2) and carried out some tests with tubes (Fig. 3).

We had to decide which internal pressure to apply and how to design tubes patterns in order to facilitate the task of constructing those tubes. At the same time, in this preliminary phase, AZC and T&P decided to make two different models or prototypes: the first one very small (3m diameter) (Fig.4) and the second one middle size (10m diameter) (Fig. 5). So, we started with the first one. It served, among others, to see how connect the trampoline membrane to the tube, how to build the tube and to check different interior pressures.

This small prototype can be seen nowadays at the Centre Pompidou (https://www.centrepompidou.fr/en/ressources/oeuvre/SagehIr) under the name "Prototype de bouée". It was decided to create a pattern with multiple rings to create de tube. These rings could not be too wide to allow the curvature without wrinkles. Importing the axe of the tube and creating the pneumatic tube afterwards was the natural way for us to design. In this project internal pressure was very high and at the first idea was to increase it until the structure explode, but finally we stopped at a pressure of 0,1MPa.

But when we had to develop the second prototype with 10m diameter, we decided to develop our software WinTess in order to create automatically any type of tube (its geometry and its patterning). It took time but it is valid for any future project with tubes.

Another temporary intervention designed by AZC and realised by T&P is the Peace Pavilion for the Museum Gardens in London (Fig. 6).

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Name of the project:	Bouncing Bridge
Location address:	Paris (originally)
Client (investor):	Competition
Function of building:	Bridge or playful object
Type of application of the membrane:	Pneumatic
Year of construction:	2013
Architects:	AZC, Paris
Multi-disciplinary engineering:	Ramon Sastre
Structural engineers:	Ramon Sastre
Consulting engineer for the membrane:	Ramon Sastre
Engineering of the controlling mechanism:	T&P and Ramon Sastre
Main contractor:	T&P
Contractor for the membrane (Tensile membrane contractor):	T&P
Supplier of the membrane material:	Serge Ferrari
Manufacture and installation:	T&P Construcció Tèxtil s.c.p.
Material:	Fluotop-T2-1302
Covered surface (roofed area):	Tubular ring of 3 and 10m diameter